SUBSTATION EARTHING DESIGN FOR A HIGH SOIL RESISTIVITY AREA

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By

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Abstract

The earthing of electric installations plays an important part as regards the behaviour of the network and personal safety when there are disturbances.

Presently all earthing designs are performed by contractors and submitted to Ceylon Electricity Board for approval. But due to lack of information at the tender stage majority of the contractors are unable to bid the earthing design part accurately resulting deviations to the contract during the implementation stage. To minimize this problem Transmission Design Branch and the Transmission Maintenance Branch of the Ceylon Electricity Board jointly decided to do the Earthing Design and submitted with the tender for bidding.

After the initial soil resistivity measurements, it was found that the resistivity values were very high compared to other Grid Substation locations. Therefore it was decided to do an earthing design for Horana Grid Substation to identify the suitability of proposed land and identify the land to be developed to construct an additional earthing mat to transfer the earth fault current. Without a properly designed grounding system large potential differences can exist between different points within the substation itself. Under normal circumstances, the current flow through the grounding grid from line - to - ground faults that constitutes the main threat to personnel.

The earthing design for Horana Grid Substation has the following objectives.

1 Ensure such a degree of human safety that a person working or walking in the vicinity of grounded facilities, is not exposed to the danger of a critical electric shock. The touch and step voltages produced in a fault condition have to be at safe levels. A safe value is one that will not produce enough current within a body to case ventricular fibrillation.

2. Provide means to carry and dissipate electric currents into earth under normal and faulty conditions without exceeding any operating and equipment limits or adversely affecting continuity of service.

3. Provide grounding for lightning impulses and the surges occurring from the switching of substation equipment, which reduces damage to equipment.

4. Provide a low resistance to protective relays to see and clear ground faults, which improves protective equipment performance, particularly at minimum faults.